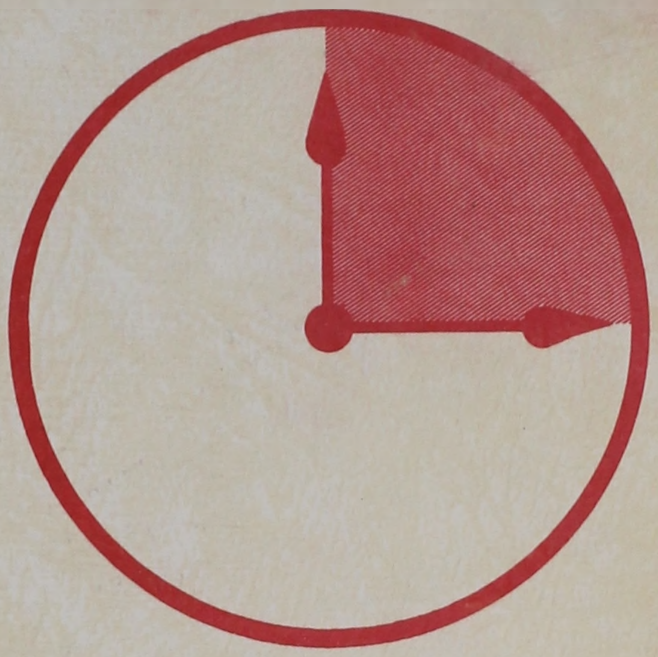
ANNUAL REPORT

1954

15 MINUTES FROM NOW...



CENTRAL STATES
FOREST EXPERIMENT STATION

COLUMBUS, OHIO

W. G. McGINNIES, DIRECTOR

UNITED STATES DEPARTMENT OF AGRICULTURE — FOREST SERVICE

ANNUAL REPORT

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. . . FIFTEEN MINUTES FROM NOW you can have a pretty good idea of what we have been doing at the Central States Forest Experiment Station for the past year. It will take you about that long to read this Annual Report.

We haven't tried to tell the whole story here —— that would take too much of your time —— but we would like you to know something about the kind of work we are doing in forest research, and how far we've come.

Can you spare us a quarter hour ?

HIGHLIGHTS

W. G. McGinnies, Director

FROM THE DIRECTOR'S OFFICE

The year 1954 has been a busy one for us here at the Central States Forest Experiment Station. It has also been a year of adjustment, a year for realigning our sights. Many changes have come about during the last 12 months that affect the Station and its research program. We have wound up some old business, begun a lot of new business, and entered some promising new fields of research. In the next quarter hour we would like to bring you up to date on all this so that you will know what we have been doing and what we are planning to do.

Forest Insects and Diseases Research Begun

The pattern for the year was set in January when the important changes began to take place. First, the Station got a new Director. Then, as a result of the reorganization of the Department of Agriculture, two new fields of work were added to the Station's program -- research in forest insects and research in forest diseases. The fortunate part about inheriting these new jobs is that we also inherited competent, experienced personnel and adequate laboratory facilities. So we are now in a position to begin producing results in these two important fields with a minimum of lost motion.

Initial Forest Survey Draws to Close

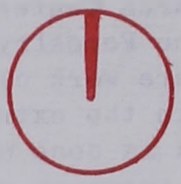
The first complete survey of the forest resources of the Central States Region is nearly finished. So, late in the summer, the greater part of the Forest Survey organization was transferred to the Lake States Station where survey activities are still in full swing. One man was left in Columbus to wind up the work here and prepare the final results for publication.

Wood-Utilization Work Expanded

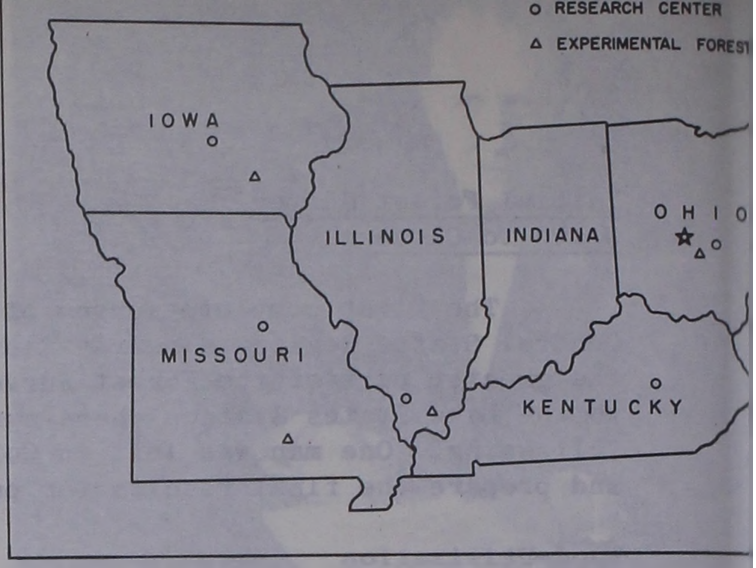
Our wood-utilization pilot-plant work in southern Illinois got added impetus this year. This plant will be devoted to finding and developing new uses for low-quality hardwoods. Success in the work will mean new industries for the region, new jobs for the people, and new value for the forests of the hardwood area.

Kentucky Gets Research Center

The 83rd Congress provided for establishing a new forest research center in Kentucky. Once producers of some of the world's finest hardwoods, the forests of eastern Kentucky and surrounding areas are now growing timber at but a fraction of their potential rate. We hope to be able to help lead the way in making these forests produce more and better timber.



OUR RESEARCH CENTERS



Location of research centers and experimental forests

Although the Station is headquartered in Columbus, Ohio, our work is spread out over the six Central States -- Ohio, Indiana, Illinois, Iowa, Kentucky, and Missouri. The research is directed and coordinated, and the results disseminated from the Columbus office. But most of the actual experimental work is carried out "in the field" and administered through our five research centers located in the major forest areas of the region, and from our insect laboratory located near Columbus. Each of our forest research centers works cooperatively with a local college or university. Our personnel benefit from the library, laboratory, and technical facilities made available to them, and our research activities also benefit from being coordinated with those of the college or university. This gets more work done faster and better.

Although all the centers are devoted to the general problem of managing, developing, protecting, and utilizing the forest resource, certain specific, more localized problems receive special attention at each place.

Ames (Iowa) Research Center

The Ames Forest Research Center is maintained in cooperation with Iowa State College. The Forestry Department and the Agricultural Experiment Station there work closely with the Center in conducting forest research in the extreme northwestern part of our territory. Much of the work is done on a 3,100-acre tract of timber set aside for forest research by the Amana Society, a private corporation.

Athens (Ohio)
Research Center

The Athens Forest Research Center is maintained in cooperation with Ohio University. It is located in the heavily forested hill country of southeastern Ohio. Site for much of the experimental work is the Vinton Furnace Experimental Forest, a 1,200-acre tract owned by the Baker Wood Preserving Company but leased to the Station for carrying on forest research.

Berea (Kentucky)
Research Center

The Berea Forest Research Center is maintained in cooperation with Berea College. This Center was just established in December and the work so far has consisted mainly of assembling personnel and setting up an office. It is expected that much of the experimental work will be carried on in the Cumberland National Forest nearby.

Carbondale (Illinois)
Research Center

The Carbondale Forest Research Center is maintained in cooperation with Southern Illinois University. Field studies are conducted at the 3,000-acre Kaskaskia Experimental Forest. When the new wood-products pilot-plant is completed, it will be operated cooperatively with Southern Illinois University to develop new ways to use small, defective trees.

Columbia (Missouri)
Research Center

The Columbia Forest Research Center is maintained in cooperation with the University of Missouri. The 10,000-acre Sinkin Experimental Forest serves as an outdoor laboratory where theories are developed and tested and the results of different treatments may be observed.

INSECTS & DISEASES

Scanning elm limb for
radioactive insect eggs

Insects and disease destroy more timber in the Central States Region each year than does fire. Unfortunately, until this year we have had neither the personnel nor the facilities to devote to these critical problems. However, when the Department of Agriculture was reorganized in 1953, the Forest Service became responsible for research in the control of forest-tree insects and diseases. So in January of this year we welcomed a group of experienced entomologists and pathologists into the fold and set to work.

Insects and Isotopes

A research technique that has received a lot of attention in recent years is using radioactive materials to trace various life processes. We used radioactive phosphorus in studying the leafhopper that carries a certain virus disease of elm trees. Interest was centered on the habits of egg laying. The tiny eggs are laid in the corky layer of elm bark, making it extremely difficult to locate and keep tab on them. Eggs were made radioactive by a seemingly round-about but very effective process. Radioactive phosphorus was "fed" to elm seedlings; female insects were allowed to feed on the foliage of these seedlings; and the radioactivity was transmitted from the females to their eggs. The deposited eggs were then very readily located by means of a geiger counter.

Controlling Pine Insects

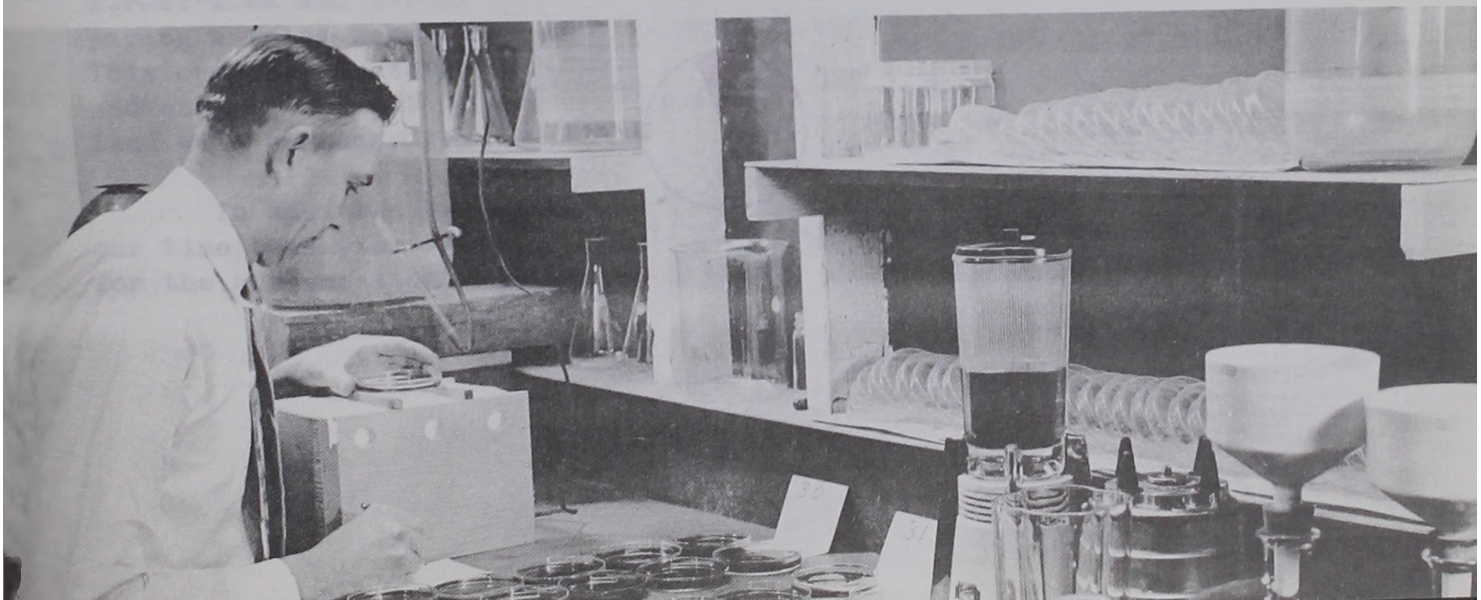
Forest plantations in the Central States contain many thousands of red pine trees. Unfortunately, this species is subject to serious attack by two insect pests -- the European pine sawfly and the European pine shoot moth. DDT sprays or a water suspension of a specific virus applied from the air or ground have given very satisfactory control of the sawfly. We are planning to try to develop an effective control for the shoot moth very soon.

Can Trees Be "Vaccinated" Against Insects?

People and animals can be vaccinated or get "shots" to prevent or cure certain ailments. Why can't trees be treated internally to protect them from insect attack? With this idea in mind, entomologists have been working for several years developing insecticides that can be absorbed into plants through the roots or leaves. The idea is to find materials that will kill or at least repel insects that feed on the plant but be harmless to the plant itself. Such materials are called "systemics."

As a first step along this path, the Station has begun testing the new systemics for the control of the borer that attacks black locust. Although one purpose of these studies is to perfect techniques for carrying on such experiments, success in the studies themselves could lead to the control of the locust borer. Since black locust is used extensively throughout the region for reforesting poor land, control of the borer would be a boon to the reclamation program. As it is, because of the borer, black locust seldom yields anything bigger or more valuable than fence posts.

Number of test "animals" killed indicates effectiveness of a systemic



Oak Wilt Disease

Disease in trees is an insidious thing. You usually can't see it work; you can only see the results. And when the results become apparent, it is often too late to do anything about control. So the best way to fight disease is to prevent it.

The most serious forest disease problem in our region at present is oak wilt. This fungus disease is known to have been present in this country at least since 1944, probably earlier. For a number of years it was believed that the disease was confined to Wisconsin, Iowa, and Minnesota, but it is now known to have spread southward and eastward into 18 states, including all six of the Central States. Although losses have not been severe as yet in the Central States as a whole, the constant threat of an epidemic hangs over the oak forests. Oak wilt kills the trees it infects and there are no species of oak known to be resistant or immune to its attack.

Our oak wilt research is centered at the Columbia (Missouri) Research Center. Here emphasis is being placed on finding ways to control the spread of the disease. Although the carrier of the disease is not definitely known, we suspect it is an insect, so our search is being directed along this line.

"Census taker" in action

ECONOMICS

HOW MUCH TIMBER?

For the past 8 years we have been carefully taking a census of the timber in the Central States Region. State by state, county by county, we have examined the forests of the area from the air (by means of aerial photographs) and on the ground. We're about done with the initial forest survey now. The plan is to repeat the survey every 10 years so as to keep a current inventory of the region's forest resources.

In 1954, we completed the field work in Iowa. This leaves only the forested portions of Kansas and Nebraska to be done. So, in order to consolidate the final stages of this work with that of the North-Central Region, almost our entire Forest Survey staff was transferred to the Lake States Forest Experiment Station at St. Paul, Minnesota late in the summer. The reports on Iowa, Kansas, and Nebraska will originate from there.

Two preliminary reports on the Ohio Forest Survey were published this fall. Each of these reports contains the basic forest-area and volume data for a part of the State. We are preparing a third report to summarize these data for the whole State. This one will contain, in addition, information on timber growth and cut. The final report on Indiana's 4.1 million acres of forest land will be ready for publication in 1955.

In addition to carrying on our regular survey work, much of our time this year was spent in completing our portion of the work for the current Timber Resource Review.

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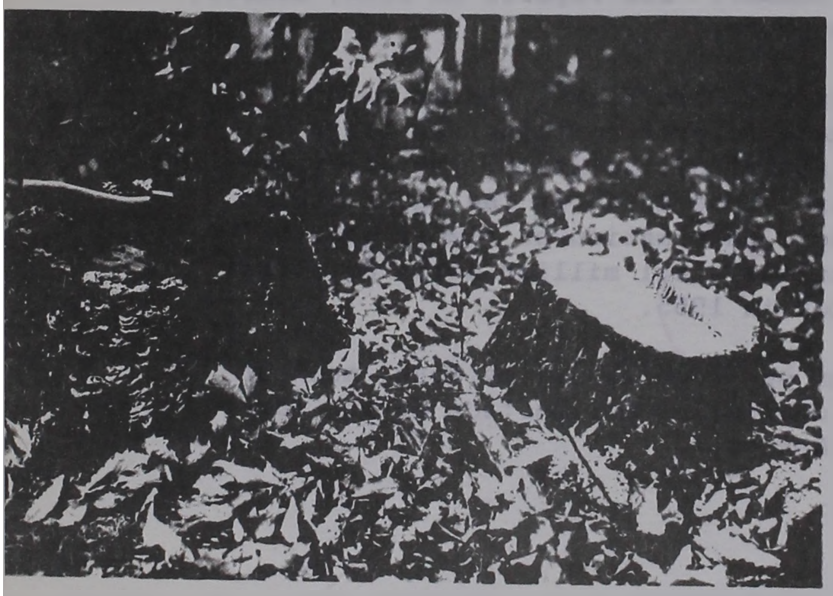
MARKETING FARM TIMBER

Every farm-woodland owner who has become interested in improving and managing his patch of timber for the continuous production of wood is confronted with the question: "Where and how should I sell my timber?" From long experience the farmer knows where and how to sell his corn, or his potatoes, or his cattle. But this business of treating his woodland like a crop is new to him and so is the problem of marketing the harvest. It is a critical problem too, because if he cannot sell his logs, he soon loses all incentive to produce them. So we have two men working fulltime on marketing research -- finding new and better ways to sell forest products.

As part of this work, a directory of buyers of primary timber products for the State of Kentucky is being prepared in cooperation with the Kentucky Division of Forestry, the Kentucky Agricultural Experiment Station, and the Cumberland National Forest. The directory will also include general specifications for timber products bought in Kentucky. It is intended for use by buyers and manufacturers of semi-finished wood products as well as woodland owners. A similar study is now under way in Iowa.

Estimating Volume from Stumps

Timber owners and operators occasionally have need for an estimate of the volume of trees that have already been cut and removed. Such need arises when timber has been taken without the owner's permission or when it was cut before the buyer and seller agreed on the volume and value of the trees. To meet this need, we published a Technical Paper describing how to determine the volume of trees from stump measurements only.



The stump on the left has been cut about 3 years; the one on the right is less than a year old. Note fungi on older stump and difference in color of the exposed faces.

MANAGEMENT

Managing farm woodlands pays off: One year's cut from a 24-acre demonstration forest.

Some people think of forest management as being restricted to the business and financial end of forestry. Others have a broader interpretation of the term and include silviculture and many other phases of forestry under this title. If it were possible to separate them, we could say that it is the forest manager's job to decide what the objectives are in managing a certain stand and it is the silviculturist's job to determine how to attain those objectives. But the two jobs are usually so closely related that they often become one. And so forest management is generally understood to include all the subjects covered in this and the following five chapters.

Managing Small Tracts

A farmer can readily see the value of fertilizing his corn field or feeding a steer because he usually makes money on these investments the same year. But it is often difficult to show an owner of a 40-to-50-acre woodlot that he can also make money growing trees. On several of our experimental forests we have embarked on long-term studies to find out and demonstrate how best to manage small forests for a continuing yield.

On a 24-acre "farm woodland" on the Kaskaskia Experimental Forest in southern Illinois we have just completed the seventh annual cut. During this 7-year period we have removed 29 thousand board-feet of logs and bolts from this upland, mixed-hardwood stand. The remaining stand contains as much volume as did the original stand -- 96 thousand board-feet, gross. The total products removed represent a value of 800 dollars at roadside. So far only the poorest trees have been removed -- the better ones have been left for future growth and harvest. A similar study is now getting under way at the Vinton Furnace Experimental Forest in Ohio.

Various Management Systems Being Studied

There is no one "right" way to manage any particular stand. The one thing of course that has more influence than any other on how a stand is to be managed is the desire of the owner. What kind of products he wants to produce and how much money he wants to invest have a lot to do with what system of management is "right" for his forest. A system that maintains the best stand silviculturally may not always provide the highest return to the owner. So at our various experimental forests we are studying numerous methods and intensities of management to illustrate the economic returns as well as the biological effects of different cutting plans. From such information the forest owner can select the system that best fits his particular needs. We try to make the sites of these management studies as accessible and as close together as possible so that visitors can readily see them and compare the results.

The photos on the opposite page show three stages in a shelterwood-cutting experiment on the Kaskaskia Experimental Forest in southern Illinois. The original stand was a mixture of yellow-poplar and oak and was in a cove. In 1950 we cut the stand by the shelterwood method, removing all the merchantable sawlog and mine-prop trees except about 12 of the largest and best trees per acre. One year after the cut the ground was still rather bare. But 4 years after the cut, bare areas were covered with vegetation. Tree reproduction, chiefly yellow-poplar, is also becoming established.

Stand Managed Under Shelterwood Method

Original yellow-poplar and mixed oak stand.

One year after removing all but 12 merchantable trees per acre.

Four years after cutting.

SILVICULTURE

Thinning 30-year-old shortleaf pine stands like this will yield 400 to 600 posts per acre.

The Society of American Foresters, in its publication Forestry Terminology, defines silviculture as "The art of producing and tending a forest." More specifically it is the art and science of manipulating forest stands so as to produce the most good trees in the shortest possible time. The major phase of silviculture has to do with cutting, for it is by judicious selection of trees to be cut that the silviculturist produces the kind of forest he wants.

Thinning

The purpose of thinning is to reduce the density of a stand so that the remaining trees have room enough to grow fast but are close enough together to shade each other and cause natural pruning of the lower limbs. The major problems in thinning are when to start thinning, how much to thin, and how often to thin.

Results recently reported on experiments in southern Illinois indicate that when a loblolly pine plantation becomes old enough to thin it should be thinned about every 4 years in order to maintain accelerated growth. Similar results were obtained with shortleaf pine. Pin oak stands should be thinned heavily to attain maximum growth; thinning to 65 square feet basal area does not appear to be too much.

Two other thinning experiments are being carried on in Iowa: one in 25- and 50-year-old oak-hickory stands, and the other in 90-year-old white oak stands. We are planning to publish some early results of these studies in 1955.

Pruning

The purpose of pruning is to remove the lower limbs from the bole of the trees so that subsequent growth will produce clear wood. Although many trees prune themselves naturally, this is usually a long, slow process. So foresters sometimes turn to artificial pruning, particularly for their high-value species. Whether or not it is economical to prune a certain stand depends upon the cost and effectiveness of the pruning and the ultimate value added by pruning.

Results are beginning to show up in a jack pine pruning study in southeastern Iowa. So far we have found that 50 percent of the live crowns of jack pine can be removed without decreasing either height or diameter growth significantly.

Walnut is one of the most valuable hardwood species in the Central States Region. Pruning experiments on 17-year-old black walnut plantations on strip-mined land in Kansas reveal that sprouting rather than diameter and height growth might limit the amount of live crown that can be removed at one time. Further work and observations are necessary before we can recommend any positive system for pruning walnut.

Two years after pruning this black walnut tree, a large sprout was removed leaving the fresh wound seen at the base of the original branch wound.

Five years after pruning, three new sprouts were growing near the old wounds.

Converting

When a stand has deteriorated to such an extent that it is composed almost entirely of undesirable species, the forester must find some way to convert it back to a productive forest again. Sometimes, by skillful manipulating of the residual stand, he can bring about the necessary change rapidly. Other times it is faster and better to make the conversion artifically. At any rate, foresters in the Central States are faced with the problem on many hundreds of acres of forest land.

Two studies were started in Iowa this year to determine how best to convert poor stands of upland mixed hardwoods and bottomland mixed hardwoods to stands of more valuable species. Both studies involve poisoning and girdling the residual trees and planting various species of both hardwoods and softwoods.

The advisability of converting poor ridgetop sites in southeastern Ohio from hardwood to pine is also being studied experimentally.

In a conversion study, this ridgetop oak-hickory stand on the Kaskaskia Experimental Forest was clear cut and planted to shortleaf pine.

Six years later some of the pines were already dominating the volunteer hardwood reproduction.

Improvement and Release Cuttings

The first treatment on a previously unmanaged stand is usually called an "improvement" cutting. The purpose is to remove all over-mature, defective, and otherwise undesirable trees from the stand. This stimulates growth of the good trees that are left and makes room for new trees to start.

Studies in southern Illinois show that previously unmanaged upland hardwood forests generally respond quickly to improvement treatments. Growth in 10 stands that were given such cuttings increased as much as 28 percent in 18-inch trees. In another study in Illinois, white oak pole-sized trees responded the first summer to overhead release. In stands where the larger, older trees were removed, the younger trees grew faster than similar trees in adjacent untreated stands. This shows that after a harvest improvement cutting, the smaller trees may be expected to react quickly to the greater growing space available.

Stocking

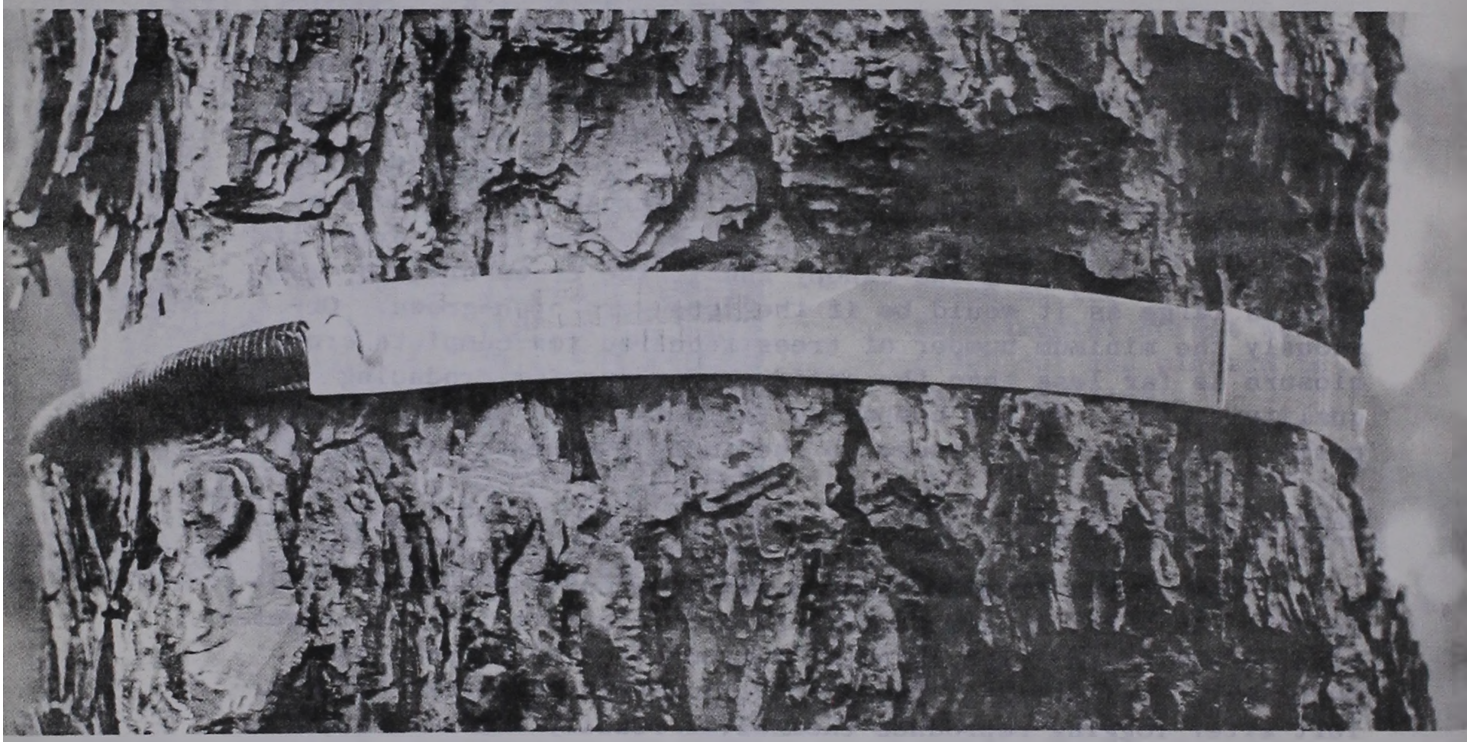
Stocking of a forest stand is usually expressed in terms of basal area. At our Ames Research Center in Iowa we are trying out another technique for evaluating stocking of forest stands. Called "Crown Competition Index," this method is based on the concept that the crown area of an open-grown tree varies directly as the tree diameter. Crown Competition Index is expressed as a percentage of the minimum stocking per acre that would exist if there were no holes in the canopy and if the crown of each tree were as large as it would be if the tree were open-grown. Obviously the minimum number of trees required for complete crown closure is far less than the optimum stocking for producing quality timber. We are comparing this new method with the common basal-area method in a study on the Amana Experimental Forest.

Natural Reproduction

One of the problems that comes from cutting the best and leaving the worst in our Central Hardwood forests is that of getting enough of the right kind of reproduction to improve and perpetuate the forests. The poorer, low-value species that are left after logging reproduce themselves readily and soon crowd out what little "good" reproduction there is. We have recently begun a comprehensive study at the Amana Experimental Forest in Iowa to find out the best way to assure desirable oak reproduction under the selection and shelterwood systems of management. Various combinations of controlled burning, grazing, and disking will be tested to find out which ground treatment results in the most reproduction. Various other reproduction studies are being carried on at our other centers.

Growth

In an effort to better understand the diameter-growth pattern of shortleaf pine, we installed homemade growth bands or dendrometers on selected trees and recorded weekly changes in tree size. First-year results indicate that trees on thinned plots start growing 2 to 3 weeks earlier than those on unthinned plots. Moreover, it is apparent that the diameter-growth rate throughout the growing season is related to the amount of soil moisture. In fact, during a record hot-dry period in the middle of the growing season, the diameters of the trees actually decreased until they were smaller than at the beginning of the growing season. This was a temporary decrease because the trees regained their original size and more during the month of August when rainfall was above normal. Any practice that affects the amount of soil moisture most certainly will affect the growth of the trees.



This homemade growth band or dendrometer measures changes in tree diameter as small as 0.01 inches.

Genetics

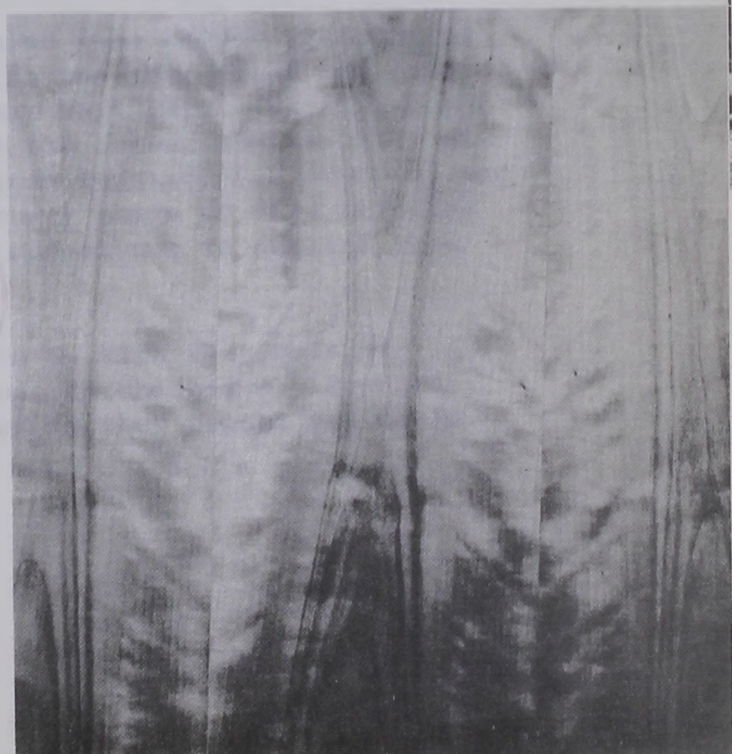
That turkey you had on Thanksgiving was a tenderer, juicier, and tastier bird than one you might have eaten a decade or two ago. The improvement came largely through genetic research. We have just "put our foot in the door" in genetic research in forestry.

We are conducting a regionwide yellow-poplar source-of-seed study. The purpose is to find out if there are geographically superior sources of yellow-poplar seed that might provide the genesis for future plantings in the region. A somewhat similar study of jack pine seed sources was begun 2 years ago. Last spring 2-year-old seedlings, grown from seed collected from 17 different sources, were planted on old fields and strip-mined land in Indiana. In addition to these studies just begun, a number of similar experiments with other species have been under way for a number of years.

Last year we reported that two new hybrids of aspen had been located in southeastern Iowa. These two hybrids have been temporarily identified as natural crosses of bigtooth aspen (*Populus grandidentata* Michx.) and European white poplar (*P. alba* L.). Because of their rapid growth on relatively poor sites, the hybrids seem to be well suited for planting in southern Iowa and northern Missouri and possibly in other areas of comparable climate and soils. Bolts from trees cut in both stands were sent to the Forest Products Laboratory for tests of physical properties of the wood. Veneer-cutting tests indicated that satisfactory veneer can be cut from the hybrids by both the rotary and slicing methods.

Iowa hybrid poplars like these...

...produce figured veneer like this.



Regeneration

Getting new trees to grow where old ones have been removed or where none are growing at all is a critical problem in forestry. In or near established stands of forest trees, the best way to get trees reestablished is the "natural" way -- let the trees reproduce themselves. But in open areas or in stands where the wrong kinds of trees are growing, it becomes necessary to establish stands artifically -- by planting or seeding.

Planting or seeding denuded and poorly stocked areas is necessary on many thousands of acres of Central States land. So the questions what, where, and how to plant still rank high on the research forester's list.

A planting study involving black locust is being carried on at the Athens Forest Research Center in Ohio. Our purpose here is to find out the best spacing for mixed black locust - yellow-poplar plantings.

One of our early regeneration studies in Ohio showed that yellow-poplar seedlings grew faster on overturned furrows than on any of four other ground preparations tested. A similar planting but on a much larger scale will be made in 1955 to confirm the results of the preliminary study.

In three different sections of Iowa we have planting studies going in which we are comparing the adaptability of up to two dozen coniferous species to conditions there. Progress reports on at least two of these areas will be published in 1955. We are also carrying on planting studies at our other centers.

Strain gauge measures resistance of logs to skidding

LOGGING

A phase of forestry long neglected by researchers is the logging operation itself. Logging is often carried on according to tradition, but sometimes the traditional way is not the best way. At our Kaskaskia Experimental Forest in southern Illinois we have recently begun to isolate and examine one by one the various tasks that make up a logging operation in an attempt to find out the easiest and cheapest way to do each job.

We started off with the problem of skidding. Now dragging a log from stump to roadside does not seem to be a very complicated job, but when you get to analyzing the process you find yourself asking many unanswerable questions. For instance, how much difference does size of tractor make in skidding costs? Does a ton of large logs pull harder than a ton of small ones? Do all logs of a given size and species weigh the same?

Preliminary results have revealed some rather interesting facts. For one thing, we found that in the species of oak tested, top logs weigh more per cubic foot than butt logs. We also found that for a given load weight, neither the number nor the size of logs affected the resistance of the load to skidding. Careful and detailed cost records were kept for every phase of this skidding study. We are analyzing the results and expect to publish them soon.

Another study in process has to do with the costs of operating and maintaining gasoline-powered chainsaws. Results of these experiments will be published as they become available.

FIRE

Unspectacular fires like this...

THE "UNSPECTACULAR" FIRE

The forest fires that make the headlines and are remembered and talked about for years are the spectacular ones -- the ones that destroy a lot of timber, property, and people. The little fires, the "unspectacular" ones, that just creep along the ground are often shrugged off by the local people with the comment, "Burning doesn't hurt the trees -- it just burns the leaves and kills the brush."

True, these unspectacular fires do not actually kill much timber and the damage they do to the ground cover is soon hidden by new growth and sprouts. But with each fire a little more of the fertility of the site goes up in smoke. And if these fires are continued periodically (every 3 to 5 years is common in the Ozarks, where our fire research is carried on), in 100 years or so the land will have been robbed almost entirely of its ability to produce merchantable timber.

The best way to control fires is to prevent them. In Missouri, more than 99 percent of the fires are man-caused and, theoretically, can be prevented. Many fires are set in the sincere belief that burning helps the soil and forage, some are purely accidental, many are the result of carelessness, and others are set with malicious intent. To get lasting results in fire prevention we must do more than just eliminate the desire to burn -- we must create a desire to protect the forests and fields from burning as strong as the desire to protect other crops and homes.

Changing the old, entrenched ideas about fire cannot be done overnight. Although fire occurrence has been greatly reduced on protected areas, it is still high and calls for strong action. Such action can do most good when the fire-control organization is planned in accordance with need. So our fire research is currently directed toward finding better ways to predict just when fires are most likely to occur. In a recent publication, "Probability of Fire Occurrence Can be Predicted," we have shown that although most of the fires on the Missouri National Forest are man-caused, fire occurrence varies directly as the ratings of the Central States Danger Meter.

Another phase of our research has to do with the effects that different kinds of cutting and the resultant slash and changes in ground cover have on rate and intensity of burning. The idea is -- and it is not a new one -- that many post-logging fires can be avoided or at least limited if the conditions that favor these fires can be eliminated at the time of cutting.

...eventually leave the ground like this.

WATER

Measuring surface runoff

Water is no longer a taken-for-granted commodity. Floods, droughts, and shortages have put water in the news many times these past few years; many of us have been affected by too little of it or too much of it. People who never thought much about water before are beginning to ask questions about it: Can we reduce floods? Can we prevent shortages? What happens to all the water that falls on the ground anyway? Where does it go?

One of the most important things that determines the fate of rainwater is the condition of the land it falls on. More water runs off the surface on bare ground than on ground covered with vegetation -- that much we know. But we need to know much more than that if we are going to be able to do anything about our water problems. We need to know how our treatment of the land -- particularly sloping land -- affects the disposition of water.

Our work of course is primarily concerned with forest land. At our Vinton Furnace Experimental Forest in southeastern Ohio we are just getting started on some studies dealing with forest-water relations. The first phase of this work is to observe and measure what is happening now. Later we will see how various logging methods affect water absorption, storage, and movement in forest soils. We are looking forward to some positive, useful results in about 2 years.

The most important thing in this photo is the grass.

"ALL FLESH IS GRASS"

These words are as true today as they were centuries ago when the prophet Isaiah wrote them. Moreover, they hold the key to the livestock grower's success and might well be taken by him as a motto. For a steer is no better than the forage he eats, regardless of his heredity. A great step would be taken in solving many of our range problems if the cattleman would think of himself more as a producer and processor of forage and less as a producer of livestock. He might even move the herd bull's picture down beside those of the baler and the corn sheller and hang a picture of his best acre of grass in the place of honor. For in one sense the animals are merely machines too -- machines for converting into meat the vegetable material that is grown on the land.

What does all this have to do with range research at the Central States Station? One of the big land-use problems in the Missouri Ozarks is how to reconcile grazing and forestry. Much of the forest land in this area is also used for open range. Unfortunately, the same acre of land cannot produce good trees and good forage at the same time. One or the other has to be given preeminence. If the landowner wants to grow timber, he must keep cattle out of the woods or at least limit their number greatly, because cattle trample the soil and eat the tree reproduction. If he wants to produce forage, he must clear most of the brush and trees away, because forage grown in the shade of and in competition with brush and trees is not nearly as nutritious as open-grown forage.

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The symbol of the controversy between the forester and the stockman is fire. The stockman commonly burns the forested range every 2 or 3 years to kill back the brush and tree sprouts and to destroy the litter that interferes with growth of forage plants. The forester objects to this repeated burning because it kills tree reproduction, damages older trees, and gradually reduces the soil's fertility.

If fire is taboo, what can the Ozark stockman do to grow more grass? First, he should think of his non-forest range: Forage yields can be increased on abandoned fields and other run-down land without the expense of clearing. Planting part of his grassland to cool-season tame grasses and part to warm-season native species will help assure him of a reasonable forage crop no matter what the weather.

Second, if it does become necessary to kill or control woody plants, the stockman should consider poisoning. Modern herbicides (such as 2,4,5-T and ammate) are much superior to fire for this work. On one Ozark area, for example, the over-story trees were girdled and the sprouts sprayed with 2,4,5-T and 2,4-D in the summer of 1952. An adjacent area was burned during the same growing season. In both 1953 and 1954 the area treated with herbicides had fewer sprouts, and in 1954 the chemically treated area was producing nearly 20 times as much herbage as the burned area.

Waste of time, effort, and resources. This is a former forest stand that somebody tried to convert to grass by burning.

Killing the trees with herbicides resulted in this fine stand of forage.

Making chips from tops and limbs.

FOREST UTILIZATION SERVICE

Our Forest Utilization Service is a 1-man unit devoted to helping the local wood-using industries with their production problems. Although recognized as a trouble-shooter in his own right, our "FUS" man serves chiefly as regional liaison officer between the industry and the Forest Products Laboratory at Madison, Wisconsin.

Utilizing "Waste" Wood

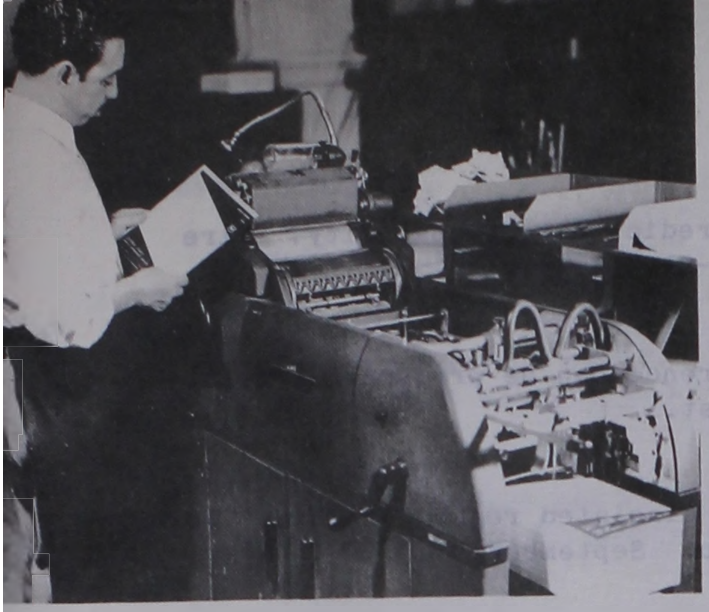
One of the things that has caught the interest of the forest-products industries in the past few years is the problem of utilizing wood that was formerly wasted. "Waste" wood includes low-grade and defective trees as well as the tops of merchantable trees, thinnings, and mill residues. Although the entire industry is interested in the problem, those most directly concerned are manufacturers of paper, hardboard, and derived products (such as charcoal, alcohol, and acetic acid).

Sixth "Logging Show" A Success

The sixth regionwide logging, sawmilling, and forestry show was held in northern Illinois in October. The show area this year was divided into several logging chances, each embodying a complete logging and sawmilling operation: felling, bucking, skidding, loading, sawing, and transporting. More than 60 equipment manufacturers, distributors, and dealers participated. In addition there were many exhibits and demonstrations sponsored by public forestry and conservation agencies and trade associations. Two "how-to" exhibits attracted much attention and favorable comment: Treating fence posts with preservative and drying farm lumber with a crop drier. Approximately 4,000 people attended the 2-day event.

Because of the success of this and previous shows, the Extension Foresters in the Central States Region have decided to make the "Logging Show" an annual event, rotating the location from state to state. Plans are well under way for holding the 1955 show in Kentucky.

Part of 1954 Logging Show site



PUBLICATIONS

On this and the next two pages we have listed our 1954 publications. If you are on our mailing list, you no doubt received those that pertain to your particular fields of interest. If you would like any of the others, we would be happy to send them to you. If you do not receive our publications regularly and would like to, we will be glad to add your name to our mailing list upon request.

PUBLICATIONS FOR 1954

Champagne, E. Garth
Wood chip mulch improves red pine survival. Sta. Note 86, 2 pp. July.

---------- and Krajicek, John E.
Hardwood slash can pay its way. Sta. Note 83, 2 pp. February.

Clark, F. Bryan
Forest planting on strip-mined land in Kansas, Missouri, and Oklahoma. Tech. Paper 141, 33 pp. March.

Wooden nickels or wooden dollars. Ozark Mountaineer 2(11): 3. June.

Clear, abundant water comes from good forest management. Ozark Mountaineer 3(1): 7. August.

Crosby, John S.
Using a danger meter to predict fire probability. Fire Control Notes 15(3): 18-21. July.

Probability of fire occurrence can be predicted. Tech. Paper 143, 14 pp. August.

Forest Survey Staff
Forest statistics for the glaciated region of Ohio. Forest Survey Release 16, 33 pp. September.

Forest statistics for the hill country of Ohio. Forest Survey Release 17, 44 pp. September.

Krajicek, John E.
Special market makes harvesting low-grade trees profitable. Sta. Note 87, 2 pp. November.

Martin, S. Clark, Nichols, J. M., and Klingman, Dayton
Controlling woody plants with 2,4,5-T; 2,4-D and ammate. Mo. Univ. Bul. 615, 7 pp. January.

--- and Clark, F. Bryan
Controlling hardwood sprouts with foliage sprays. Tech. Paper 145, 10 pp. November.

Minckler, Leon S. and Chapman, Arthur G.
Direct seeding of pines in the central hardwoods region. Tech. Paper 140, 20 pp. March.

Moessner, Karl E.
How to make stereo slides from aerial photos. Sta. Note 85, 2 pp. April.

A simple test for stereoscopic perception. Tech. Paper 144, 14 pp. September.

Quigley, Kenneth L.
Estimating volume from stump measurements. Tech. Paper 142, 5 pp. June.

Ohio farm woodlands can be profitable. Ohio State Univ. Ext. Leaflet MM 105, 5 pp. June.

Thornton, Philip L.
An aid for stereo dot counting on aerial photos. Sta. Note 84, 2 pp. April.

University of Missouri, College of Agriculture, Extension Service, and Central States Forest Experiment Station.
How to kill woody plants. Mo. Univ. Folder 26. January.

Whitten, Russell R.
Dutch elm disease and elm phloem necrosis. Proc. Ninth Ann. Mtg., North Cent. Branch, Ent. Soc. Amer. p. 36.

MANUSCRIPTS ACCEPTED BUT NOT PUBLISHED DURING 1954

Carmean, Willard H.
The structure of forest soils. Ohio Jour. Sci.

Clark, F. Bryan and Leney, Lawrence
A homemade caliper for measuring small trees. Jour. Forestry.

Liming, Franklin G. and Clark, F. Bryan
A new pole for measuring small trees. Jour. Forestry.

Martin, S. Clark
The place of range livestock in the Missouri Ozarks. Jour. Range Mangt.

Grazing-forestry relationships in the Missouri Ozarks. Soc. Amer. Foresters Proc.

Dunkeson, Robert L., and Baskett, Thomas S.
Timber harvests help offset forage decline in Missouri's managed forests. Jour. Forestry.

Minckler, Leon S.
How tree size affects pruning time of pine. Jour. Forestry.

Early growth response of central hardwoods to management. Soc. Amer. Foresters Proc.

Quigley, Kenneth L.
Growing trees grow dollars. Ky. Agr. Expt. Sta. Leaflet.

PERSONNEL

As of December 31, 1954

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Robert D. Wray, Editor; Helen C. Schober

HOWARD C. AGER, Administrative Officer; Walter R. Hudgens, Administrative Assistant; Robert A. Hanf, Ruth L. Hughes, Rachel E. Ford, Rita T. Colleli, Helen A. Curran, Patricia A. Voorvaart, Raymond A. Llewellyn, Arnold Ross, Charles T. Singer

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Margaret K. Peirsol, Statistician

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Amana Experimental Forest, Amana, Iowa -- John E. Krajicek

ATHENS, c/o Ohio University, Athens, Ohio
Robert W. Merz, Forester-in-charge; Willard H. Carmean, Raymond F. Finn, Mary O. Roberson

Vinton Furnace Experimental Forest, McArthur, Ohio -- William T. Plass, Clyde M. Morris

BEREA, c/o Berea College, Berea, Kentucky
Malcolm J. Williamson, Forester-in-charge; F. Bryan Clark

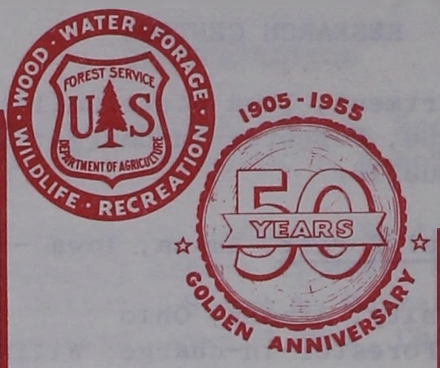
CARBONDALE, c/o Southern Illinois University, Carbondale, Illinois
Richard D. Lane, Forester-in-charge; David E. Herrick, Leon S. Minckler, Glenn H. Deitschman, William H. DeBolt, Chester E. Jensen, Roy A. Whitmore, Cleo Caraway, Joan D. Heape, Russell A. Ryker (Military furlough)

Kaskaskia Experimental Forest, Elizabethtown, Illinois -- Benjamin A. Roach, John W. Greth, Millard R. Spivey

COLUMBIA, c/o University of Missouri, Columbia, Missouri
Franklin G. Liming, Forester-in-charge; S. Clark Martin, William D. Buchanan, Thomas W. Jones, Ivan L. Sander, Helen C. Mohler, Evelyn H. Wright

Sinkin Experimental Forest, Salem, Missouri -- Nelson F. Rogers, John S. Crosby, Wayne M. Harrison

50 YEARS OF FORESTRY



You will see a lot of these two emblems during 1955. They symbolize the Golden Anniversary of the U. S. Forest Service. We are 50 years old this year.

This is an anniversary that is shared by everyone who has been working in forestry during the past half century -- the State forestry organizations, the forest schools, the forest industries and associations, the conservation groups, and many others. It marks 50 years of progress in making our forest resources contribute their share to the wealth and health of the nation. And at the 50-year point we can look back with pride and forward with hope that the next 50 years will bring even greater progress.

TERRITORY SERVED BY THE

CENTRAL STATES FOREST EXPERIMENT STATION

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE